





The planet **MERCURY** is the closest to the Sun, orbiting within 46 million km to the Sun at its closest point. Because it rotates on its axis once every 58.9 days and circles the Sun once every 87.9 days, Mercury rotates exactly three times around its axis for every two orbits around the Sun. If you wanted to stay up for one solar day on Mercury (sunrise to sunrise), you would be awake for two Mercurian years (176 Earth days). The surface temperature has the greatest temperature range of any planet or satellite in our system, reaching 427° C on the day side and -183° C on the night side. Mercury's atmosphere is composed of sodium and potassium, which is probably derived from the surface. While Mercury does have an atmosphere, it does not have satellites.

Smaller than all the other planets, except for Pluto, Mercury is about one-third the size of Earth. This planet has a magnetic field, although Earth's magnetic field is considerably stronger. However, the planet's density (5.4 g/cm³) is about the same as Earth's. Scientists think the density indicates an enormous iron core composing some 75 percent of Mercury's diameter. A rocky mantle and crust only about 600 km thick surround the core. When the core and mantle cooled, the radius of the planet reduced by 2 to 4 km. The probable result of the planet's crust shrinking is Mercury's unique system of compressive fractures.

Mercury has experienced a unique geological history which has resulted in a global system of fractures caused by shrinkage of the planet. Soon after the planet formed it nearly melted from decay of radioactive elements and the inward migration of iron that formed its enormous core. This led to the expansion of the planet and extensive fracturing of the surface which provided an exit for lava to reach the surface and form the smooth plains within and between the craters. At about the same time and like the other planets, Mercury was subjected to heavy bombardment by asteroidal and cometary debris left over from accretion of the solar system. During this early period of heavy bombardment, the 1300 km diameter Caloris basin was

formed by the collision of a gigantic asteroid with Mercury. The strong shock wave produced by the impact traveled through the planet to instantaneously form the hilly, lineated terrain on the opposite side. Over the next half-billion years, the core and mantle began to cool. Mercury's radius decreased by about 2 to 4 km, and the crust was subjected to compressive stresses that resulted in the lithosphere becoming strong enough to close off magma sources. Prior to the magma sources being closed off, eruptions of lava within and surrounding the large basins, such as Caloris, formed the smooth plains. Since that time, only occasional impacts of comets and asteroids have occurred on Mercury.

To date the only spacecraft to explore Mercury was *Mariner 10* in 1974–75. It imaged about half of the planet on its three encounters, so half of the planet is still unexplored. Although the surface of Mercury resembles the Moon, there are significant geological differences. Like the Moon, it has heavily cratered upland regions and large areas of smooth plains that surround and fill impact basins. It also has a surface covering of porous, fine-grained soil like the lunar surface. Unlike the Moon, Mercury's heavily cratered uplands contain large regions of gently rolling, smooth plains—the major type of terrain on the planet.

Fast Facts

Namesake	Messenger of the Roman Gods
Diameter	4,878 Kilometers
Mean Distance from Sun	57.8 million Kilometers
Mass	6/100 the Mass of the Earth
Density	5.44 g/cc
Surface Temperature	
Maximum Day Side	740° Kelvin (467°C)
Maximum Night Side	90° Kelvin (-183°C)
Rotational Period	58.6 days
Eccentricity of Orbit	0.206
Rotational Period (1 Mercury Day)	58.6 Earth days

Significant Dates

- 1610— Italian astronomer Galileo Galilei made first telescopic observation of Mercury.
- 1631— French astronomer Pierre Gassendi made first telescopic observations of the transit of Mercury across the face of the Sun.
- 1639— Italian astronomer Giovanni Zupus discovered Mercury has phases, which is evidence that the planet circles the Sun.
- 1641— German astronomer Johann Franz Encke made the first mass determination using the gravity effect on the comet Encke.
- 1889— Italian astronomer Giovanni Schiaparelli produced the first map of Mercury's surface features.
- 1965— American radio astronomers Gordon Pettengill and Rolf Dyce measured Mercury's rotation period to be about 59 days.
- 1968— Surveyor 7 took the first spacecraft picture of Mercury from the lunar surface.
- 1974— Mariner 10 made the first fly-by within 900 km of Mercury.
- 1975— Mariner 10 made the third and final fly-by of Mercury.

About the Image

This false color photomosaic of Mercury is composed of images taken by the Mariner 10 as it flew by the planet after the first encounter in March 1974. The image shows the Caloris basin at the left of the terminator surrounded and filled by younger smooth plains deposits. This 1,300 km diameter impact basin formed about 4 billion years ago when a large asteroid or comet struck Mercury. The smooth plains resemble the lunar maria, the smooth, dark lava plains that are concentrated on the Moon's nearside. However, the Mercurian plains display less contrast in reflectivity with heavily crater terrain shown on the right, top and bottom than is seen between the lunar maria (dark) and the lunar highland (light).

References

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